Western Regional Cool Season Legume Evaluation Trials & Nurseries - 2010

Prepared by

Grain Legume Genetics and Physiology Research Unit

U.S. Department of Agriculture

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and

Department of Crop and Soil Sciences

Washington State University

Pullman, WA 99164-6434

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PROGRESS REPORT: 2010 WESTERN REGIONAL YIELD TRIALS

Participants: George Vandemark[1], Rebecca McGee[1], Chenci Chen[2] and Kevin McPhee[3]
[1]USDA-ARS Grain Legume Genetics and Physiology Research Unit, Pullman, WA 99164
[2]Montana State University, Central Ag Research Center, Moccasin, MT, 59462
[3]North Dakota State University, Department of Plant Sciences, Fargo, ND, 58108

Increases in pulse crop production in the Northern Plains continue to warrant expanding efforts in developing new varieties of pulse crops that are particularly adapted to this important production zone. Our breeding program has historically collaborated with scientists from Montana State University and North Dakota State University in the annual evaluation of advanced pea, lentil and chickpea breeding lines at several locations is MT and ND. Selections have also been made from segregating populations and preliminary breeding lines of the USDA-ARS grain legume breeding program based on performance in MT and ND, in order to develop new varieties for the Northern Plains.

In 2010, advanced pea yield trials (19 entries) were conducted in North Dakota at Williston and Minot. Average yield of the advanced pea trial in Minot was 3155 lb/ac while the mean yield in Williston was 2459 lb/acre. The means of individual entries in Minot ranged from a low of 2735 lb/acre (Stirling; green) to a high of 3643 lb/acre (PS06100490; green). The means of individual entries in Williston ranged from a low of 2122 lb/acre (PS051000120; green) to a high of 2748 lb/acre (PS04100710, yellow). Across all locations, 10 breeding lines, six green and four yellow, had yield greater than Aragorn. Interestingly, the yellow peas appeared to exhibit more stable performance than green peas. The yellow line PS03101822 was ranked third in Minot and second in Williston, and the yellow variety Carousel was ranked fourth at both locations. Conversely, the green line PS01600490 was ranked first at Minot and fifteenth at Williston, and the green pea line PS05100840 was ranked second at Minot and sixteenth at Williston. The overall highest yielding lines were the yellow line PS03101822 followed by the green line PS06100490.

Data was lost for lentil and chickpea trials in Williston due to excessive precipitation and cool temperatures encountered after seeding at this location. Advanced yield trials were successful for both lentil (22 entries) and chickpea (10 entries) at Minot. For lentils, the mean yield of all entries at Minot was 1130 lb/acre. Individual entries had means ranging from a high of 1777 lb/acre (Eston) to a low of 666 lb/acre for the Turkish red breeding line LC06601228T. At Minot the highest yielding breeding lines were two Eston-type lines, LC03601590E (1740 lb/acre) and LC01602273E (1739 lb/acre), followed by the Laird-type breeding line LC07600517L (1688 lb/acre).

The average yield for chickpeas over all entries at Minot, ND in 2010 was 2130 lb/acre. Individual entry means ranged from 575 lb/acre for the Spanish white cultivar Dylan to 3050 lb/acre for the small café breeding line CA0469C025C. Sawyer, Dwelley and Sierra had average yields of 2810, 2080 and 1598 lb/acre, respectively. The top three café kabuli breeding lines had a mean yield of 2813 lb/acre.

In Montana in 2010 advanced yield trails were conducted for pea, lentil and chickpea at Richland and Moccasin. The overall mean of all pea entries at Richland was 2853 lb/acre. The means of green pea entries ranged from 2251 lb/acre (PS05100632) to 3137 lb/acre (PS06100760). The means of yellow pea entries ranged from 2682 lb/acre (PS06101043) to 3375 lb/acre (Delta). The overall mean of all pea entries at Moccasin was 2800 lb/acre. The means of green pea entries ranged from 2513 lb/acre (PS05100120) to 2935 lb/acre (Stirling). The means of yellow pea entries ranged from 2436 lb/acre (PS06101119) to 3254 lb/acre (PS04100710).

For lentils, the overall mean of all entries at Richland was 1446 lb/acre. The means of individual entries ranged from 899 lb/acre for the red zero-tannin line LC9602585RZ to a high of 1835 lb/acre for the Richlea-type breeding line LC01602300R. The mean yield of check cultivars ranged from 937 lb/acre

for the red zero-tannin lentil Cedar to 1751 lb/acre for the new Essex –type cultivar Essex. Among comparisons within market classes between check cultivars and varieties, the greatest differences were observed for Spanish Brown entries. The two Spanish brown entries on average outyielded the check cultivar Pardina by 29%.

At Moccasin the overall mean of all lentil entries was 1812 lb/acre. The means of individual entries ranged from 1147 lb/acre for the red zero-tannin line Cedar to a high of 2119 lb/acre for the Eston-type breeding line LC03601590E. The mean yield of check cultivars ranged from 1147 lb/acre (Cedar) to 2069 lb/acre for the Spanish Brown cultivar Pardina. Among comparisons within market classes between check cultivars and varieties, the greatest difference was observed for red zero-tannin entries, with the breeding line LC9602585RZ outyielding the check Cedar by 23%. Interestingly, at Moccasin the check cultivar Pardina outyielded both Spanish Brown breeding lines by at least 5%.

For chickpeas, the overall mean of all entries at Richland was only 291 lb/acre. The means of individual entries ranged from 84 lb/acre (Dwelley) to 633 lb/acre (Sawyer). The means of breeding lines ranged from 150 lb/acre (CA04900843C) to 530 lb/acre (CA04900421C). The overall mean of all entries at Moccasin was 1376 lb/acre. The means of individual entries ranged from 1228 lb/acre (Sierra) to 1500 lb/acre (Dwelley). The means of breeding lines ranged from 1307 lb/acre (CA04900843C) to 1466 lb/acre (CA04900851C).

We anticipate conducting Western Regional Yield Trials in 2012 in collaboration with scientists from Montana State University and North Dakota State University, and our grower cooperators in MT and ND. We hope also to include in these trials promising materials from the breeding programs of the University of Saskatchewan and North Dakota State University. A broader examination of materials from diverse breeding programs will accelerate the developing of new and improved cool season food legume varieties for pulse-small grain production systems in the Northern Plains.

Name	Minot Seed Yield	Williston Seed Yield	Mean Seed Yield
	lbs/ac	lbs/ac	lbs/ac
PS03101822	3358.63	2630.93	2994.78
CAROUSEL	3317.98	2600.20	2959.09
PS06100490	3643.40	2237.43	2940.42
PS04100710	3087.80	2747.55	2917.68
PS06100760	3208.73	2587.63	2898.18
PS03101445	3307.63	2474.43	2891.03
DS ADMIRAL	3156.00	2605.23	2880.62
PS05100632	3073.00	2555.90	2814.45
PS05101240	3196.70	2411.80	2804.25
PS06101043	3182.28	2424.35	2803.32
PS05100840	3430.00	2146.13	2788.07
PS05100736	3168.50	2387.35	2777.93
Aragorn	3123.65	2389.25	2756.45
PS06101119	2770.15	2706.20	2738.18
PS04100462	2950.18	2423.10	2686.64
Stirling	2735.23	2360.55	2547.89
PS05100120	2919.90	2122.45	2521.18
GRAND MEAN	3154.69	2459.44	2807.07
CV	9.94	7.58	9.19
LSD	371.84	221.15	338.94

Agronomic Data for the Minot, North Dakota Pea Yield Trial (1097)

Name	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes
	..cm..	..cm..		..cm..	..cm..		
PS06100490	43.50	13.60	0.31	77.00	17.00	0.22	7.00
PS05100840	45.00	13.40	0.31	87.80	32.00	0.37	7.30
PS03101822	35.50	11.10	0.32	67.50	18.80	0.28	6.30
CAROUSEL	39.00	11.80	0.30	74.50	31.00	0.42	5.50
PS03101445	35.80	11.00	0.32	67.30	21.80	0.33	5.80
PS06100760	39.80	12.50	0.32	73.00	18.50	0.26	5.50
PS05101240	42.50	13.30	0.32	70.80	18.50	0.27	5.80
PS06101043	42.00	10.10	0.24	74.80	24.50	0.34	6.30
PS05100736	40.00	13.80	0.35	65.30	15.80	0.24	5.80
DS ADMIRAL	41.80	12.90	0.31	69.30	32.00	0.47	5.50
Aragorn	37.00	10.80	0.30	77.00	26.00	0.34	6.80
PS04100710	37.50	11.40	0.31	58.30	13.80	0.24	5.00
PS05100632	31.00	10.00	0.33	69.80	23.80	0.35	6.50
PS04100462	36.30	11.40	0.33	65.30	13.30	0.21	7.00
PS05100120	41.50	13.00	0.31	77.00	15.30	0.20	8.00
PS06101119	35.00	11.60	0.33	60.80	16.30	0.27	7.00
Stirling	37.50	10.40	0.28	68.30	14.30	0.21	5.50
GRAND MEAN	38.85	11.88	0.31	70.78	20.72	0.29	6.25
CV	22.70	23.70	16.33	11.63	16.45	22.38	17.80
LSD	10.46	3.34	0.06	9.76	4.04	0.08	1.32

2010 Western Regional Dry Pea Trial - Moccasin, Montana Agronomy Summary.

Montana Ag. Experiment Stations - Centeral Ag. Research Center, Moccasin, MT

	Grain Yield (@ Moist)		Stand		Plant Lenghts/Height				Harvest
Entry	Field	13%	Establish	Flower	Vine	Canopy	Shrinkage	Test Wt	Grain Moist
	----- (lbs acre^{-1}) -----		(% target rate)	(Date)	(cm)		(Canopy/Vine)	(lbs bu^{-1})	(%)
Yellow Peas:									
Delta	3195 [a]	3139 [ab]	90.5 [a]	27-Jun	64.8	59.3	0.917	65.5 [a]	14.4
DS Admiral	2697	2642	68.0	29-Jun	**80.5** [a]	69.5 [ab]	0.862	64.5	14.8
Carousel	2685	2648	85.6 [a]	26-Jun	70.5	63.0 [b]	0.897	**66.0** [a]	14.2
PS04100710	3254 [a]	**3180** [ab]	87.9 [a]	27-Jun	54.3	47.3	0.872	65.0 [a]	14.9
PS05101240	2809	2784	81.3	27-Jun	56.8	51.0	0.905	64.6	13.7
PS06101043	2679	2594	56.5	28-Jun	72.3	64.8 [b]	0.897	62.7	15.5
PS06101119	2436	2419	74.6	26-Jun	48.0	48.8	0.950	64.1	13.6
Green Peas:									
Majoret	2703	2608	85.7 [a]	29-Jun	61.8	52.5	0.851	64.4	15.8
Cruiser	2710	2680	77.6	29-Jun	69.0	59.8	0.870	63.6	14.0
Medora	2743	2705	73.2	2-Jul	74.3 [a]	**72.0** [ab]	**0.967** [ns]	64.2	14.2
Stirling	2935	2907 [b]	70.6	24-Jun [a]	51.3	50.0	0.945	64.1	13.6
PS03101445	2863	2829	77.6	29-Jun	57.0	53.8	0.945	64.4	14.0
PS04100462	2686	2640	76.7	2-Jul	47.5	44.4	0.936	63.8	14.3
PS05100120	2513	2465	97.2 [a]	28-Jun	62.5	55.5	0.888	63.4	14.7
PS05100632	2769	2754	**98.7** [a]	**23-Jun** [a]	66.0	58.3	0.884	64.0	13.5
PS05100736	2869	2778	76.9	2-Jul	56.0	56.0	0.954	63.9	15.7
PS05100840	2719	2689	89.8 [a]	1-Jul	62.8	58.3	0.929	63.9	13.9
PS06100490	2680	2687	83.6 [a]	27-Jun	64.8	59.4	0.919	64.7 [a]	12.8
PS06100760	**3255** [a]	3137 [ab]	90.6 [a]	30-Jun	59.3	52.8	0.895	64.2	**16.1** [ns]
Trial Means:	2800	2752	81.2	28-Jun	62.1	56.6	0.910	64.3	14.4
$LSD_{0.05}$ (by t)	305	251	15.9	1	6.8	6.9	NS	1.3	NS
C.V.% (s/means)	7.7	6.4	13.8	0.4	7.7	8.6	8.0	1.4	13.6
F-Value	4.37	5.72	3.5	50.68	14.02	8.94	0.87	2.48	0.83
P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.01	0.66

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[b] - Denotes the statistically similar highest values within a pea type (i.e. Yellow and Green peas).

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level (see "P-Value").

2010 Western Regional Dry Pea Trial - Richland, Montana Agronomy Summary.

Montana Ag. Experiment Stations - Central Ag. Research Center, Moccasin, MT

Entry	Grain Yield Field Moist	Grain Yield 13% Moist	Canopy Height	Test Wt	Harvest Grain Moisture	Lodging Potential
	---------- (lbs acre^{-1}) ----------		(cm)	(lbs bu^{-1})	(%)	(1-Low; 10-High)
Yellow Peas:						
Delta	**3375** ns	3226	37.3	64.2 a	**16.6** ns	7.7
DS Admiral	3347	**3264** ns	**63.0** ab	64.5 a	15.2	0.0 a
Carousel	2974	2888	54.7 ab	65.0 a	15.6	3.3 a
PS04100710	3222	3159	41.0	65.0 a	14.5	6.3
PS05101240	2775	2707	26.7	63.1	15.1	9.0
PS06101043	2682	2594	44.7	62.8	15.8	3.3 a
PS06101119	2827	2743	43.0	63.0	15.6	6.3
Green Peas:						
Majoret	3015	2981	51.3 b	**65.4** a	14.0	6.0
Cruiser	2720	2642	47.3 b	63.6	15.5	3.0 a
Medora	2937	2825	55.7 ab	63.3	16.1	1.7 a
Stirling	2627	2566	39.3	63.6	14.9	1.7 a
PS03101445	2995	2901	46.0	63.9	15.7	1.7 a
PS04100462	2752	2691	42.0	64.2 a	14.9	1.7 a
PS05100120	2377	2310	34.3	62.7	15.4	7.7
PS05100632	2251	2218	47.3 b	63.2	14.1	1.7 a
PS05100736	2973	2951	45.3	64.4 a	13.7	3.3 a
PS05100840	2669	2624	47.0	64.2 a	14.6	6.3
PS06100490	2550	2516	43.7	62.5	14.1	9.0
PS06100760	3137	3034	35.0	64.3 a	15.8	9.0
Trial Means	2853	2781	44.5	63.8	15.1	4.7
$LSD_{0.05}$ (by t)	NS	NS	8.4	1.4	NS	4.4
C.V.% (s/means)	14.03	13.46	11.39	1.332	9.43	**49.39**
F-Value	1.71	1.76	8.14	2.99	0.92	3.83
P-Value	**0.08**	**0.07**	0.00	0.00	**0.57**	0.00

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[b] - Denotes the statistically similar highest values within a pea type (Yellow vs Green peas).

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level.

Name	Seed Yield	% of Eston
	lb/ac	lb/ac
Eston	1777.18	100.00
LC03601590E	1739.95	97.91
LC01602273E	1738.95	97.85
LC07600517L	1687.88	94.98
Richlea	1651.28	92.92
LC01602300R	1431.99	80.58
Crimson	1195.47	67.27
ESSEX	1173.82	66.05
Riveland	1078.31	60.68
LC01602062T	1045.23	58.81
LC06601734L	1002.45	56.41
LC06600839L	890.07	50.08
Pardina	886.03	49.86
Morena	823.16	46.32
Shasta	790.34	44.47
LC07600224YZ	771.09	43.39
Cedar	768.75	43.26
LC06600907P	756.14	42.55
LC99602585RZ	717.91	40.40
LC06601228T	666.05	37.48
GRAND MEAN	1129.60	
CV	24.05	
LSD	321.55	

2010 Western Regional Lentil Trial - Moccasin, Montana Agronomic Summary.
Montana Ag. Experiment Stations - Central Ag. Research Center, Moccasin, MT

Entry	Grain Yield		Flower	Canopy Ht	Test Wt	Grain Moisture
	Harvest	13% Moist				
	---------- (lbs acre^{-1}) ----------		(date)	(cm)	(lbs bu^{-1})	(%)
Small Green						
Eston	1976 [ab]	2021 [ab]	27-Jun	31.6 [b]	64.6	10.9 [a]
Essex	1996 [ab]	2036 [ab]	28-Jun	33.0 [ab]	63.4	11.3 [a]
LC03601590E	**2119** [ab]	**2165** [ab]	26-Jun	31.8 [b]	63.8	11.2 [a]
LC01602273E	1981 [ab]	2021 [ab]	24-Jun	30.5 [b]	64.3	11.2 [a]
Large Green						
Merritt	1852 [b]	1890 [b]	**24-Jun** [a]	32.8 [ab]	60.1	11.1 [a]
Pennell	1912 [ab]	1950 [ab]	24-Jun [a]	32.0 [ab]	59.9	11.2 [a]
Rivleand	1772 [b]	1805 [b]	25-Jun	34.3 [ab]	58.8	11.4 [a]
LC06600839L	1485	1524	26-Jun	32.5 [ab]	59.3	10.7 [a]
LC06601734L	1625	1663	28-Jun	**34.5** [ab]	59.6	11.0 [a]
LC07600517L	1888 [ab]	1932 [ab]	28-Jun	32.5 [ab]	60.3	11.0 [a]
Small Red						
Crimson	1870 [b]	1919 [ab]	27-Jun	23.8	64.4	10.7 [a]
LC06601228T	1991 [ab]	2035 [ab]	25-Jun	31.1 [b]	65.2	11.1 [a]
Pardina						
Pardina	2069 [ab]	2118 [ab]	25-Jun	25.8	**67.7** [a]	11.0 [a]
LC06600907P	1838 [b]	1873 [b]	29-Jun	26.5	64.9	11.3 [a]
LC02601144P	1976 [ab]	2010 [ab]	26-Jun	31.3 [b]	65.2	**11.5** [a]
Zero Tannin-Red						
Cedar	1147	1191	27-Jun	31.8 [b]	64.0	9.6
LC9602585RZ	1427	1466	26-Jun	28.5	65.1	10.6
Zero Tannin-Green						
Shasta	1657 [b]	1721 [b]	24-Jun	34.5 [ab]	62.5	9.7
LC07600224YZ	1413 [b]	1474 [b]	26-Jun	33.1 [ab]	62.3	9.3
Medium Green						
CDC Vantage	1955 [ab]	2006 [ab]	26-Jun	34.0 [ab]	62.8	10.8 [a]
CDC Richlea	2023 [ab]	2063 [ab]	27-Jun	33.8 [ab]	61.3	11.3 [a]
LC01602300R	1896 [ab]	1933 [ab]	26-Jun	33.6 [ab]	62.6	11.3 [a]
Trial Means	1812	1855	26-Jun	31.5	62.8	10.9
$LSD_{0.05}$ (by t)	248	250	0.7	2.6	1.4	0.8
C.V.% (s/means)	9.66	9.49	0.29	5.72	1.58	5.43
F-Value	8.21	8.03	26.09	10.45	23.19	4.14
P-Value	0.00	0.00	0.00	0.00	0.00	0.00

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[b] - Denotes the statistically similar highest values within a pea type (i.e. Yellow and Green peas).

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level.

2010 Western Regional Lentil Trial - Richland, Montana Agronomic Summary.
Montana Ag. Experiment Stations - Central Ag. Research Center, Moccasin, MT

ENTRY	Grain Yield		Canopy Ht	Test Wt	Grain Moisture
	Harvest	13% Moist			
	---------- (lbs acre^{-1}) ----------		(cm)	(lbs bu^{-1})	(%)
Small Green					
Eston	1665 [ab]	1679 [ab]	31.0 [ab]	65.0 [a]	12.3 [a]
Essex	**1751** [ab]	**1752** [ab]	31.3 [ab]	64.1	**12.9** [a]
LC03601590E	1580 [ab]	1585 [ab]	29.0 [b]	64.1	12.7 [a]
LC01602273E	1307	1317	30.3 [b]	64.3	12.3 [a]
Large Green					
Merrit	1436 [b]	1447 [b]	30.3	61.0	12.3 [a]
Pennell	1343 [b]	1352 [b]	32.3 [ab]	60.9	12.5 [a]
Riveland	1567 [ab]	1571 [ab]	**34.7** [ab]	60.2	12.7 [a]
LC06600839L	1280	1283	30.7	59.6	12.7 [a]
LC06601734L	1502 [ab]	1506 [ab]	32.3 [ab]	60.6	12.7 [a]
LC07600517L	1572 [ab]	1584 [ab]	28.3	61.4	12.3 [a]
Small Red					
Crimson	1183	1222	26.3 [b]	64.7	10.1
LC06601228T	1526 [a]	1542 [a]	28.0 [b]	**65.4** [a]	12.1
Pardina					
Pardina	1302	1348	25.7	65.0 [a]	9.9
LC02601144P	1672 [ab]	1691 [ab]	31.7 [a]	65.4 [a]	12.0
LC06600907P	1688 [ab]	1720 [ab]	23.7	65.1 [a]	11.3
Zero Tannin-Red					
Cedar	937 [b]	944 [b]	30.0 [b]	65.0 [a]	12.3 [a]
LC9602585RZ	899 [b]	906 [b]	30.0 [b]	65.0 [a]	12.4 [a]
Zero Tannin-Yellow					
Shasta	1345 [b]	1348 [b]	33.0 [ab]	63.4	12.6 [a]
LC07600224YZ	1299 [b]	1307 [b]	34.0 [ab]	63.2	12.5 [a]
Medium Green					
CDC Vantage	1574 [ab]	1590 [ab]	32.0 [ab]	63.2	12.1
CDC Richlea	1556 [a]	1562 [a]	30.3 [b]	62.1	12.6 [a]
LC01602300R	1835 [ab]	1850 [ab]	32.0 [ab]	63.2	12.3 [a]
Trial Means	1446	1459	30.3	63.3	12.2
$LSD_{0.05}$ (by t)	273	269	3.7	0.5	0.7
C.V.% (s/means)	11.43	11.19	7.36	0.51	3.71
F-Value	6.4	6.6	4.3	101.2	8.8
P-Value	0.00	0.00	0.00	0.00	0.00

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[b] - Denotes the statistically similar highest values within a pea type (i.e. Yellow and Green peas).

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level.

Yield Summary for the Minot, North Dakota Advanced Chickpea Yield Trial (1099)

Name	Seed Yield	% of Dwelley
	lb/ac	
Dwelley	1597.71	100.00
Dylan	575.15	36.00
Sawyer	2801.40	175.34
Sierra	2080.00	130.19
CA0390B007C	2488.15	155.73
CA0469C025C	3049.93	190.89
CA04900421C	2660.98	166.55
CA04900808C	1553.23	97.22
CA04900843C	1768.81	110.71
CA04900851C	2726.85	170.67

2010 Western Regional Chickpea Trial - Moccasin, Montana Agronomic Summary.
Montana Ag. Experiment Stations - Central Ag. Research Center, Moccasin, MT

Entry	Grain Yield Harvest	Grain Yield 13% Moist	Flower	Canopy Height	Test Weight	Grain Moisture
Sawyer	1445	1459	6-Jul	37.8	57.8 [a]	12.2 [a]
Sierra	1228	1279	7-Jul	39.0	58.0 [a]	9.4
Dylan	1290	1317	5-Jul	35.3	54.4	11.5 [a]
Dwelley	**1500** [ns]	**1556** [ns]	10-Jul	39.5 [a]	57.6 [a]	9.7
CA0469C025C	1372	1398	3-Jul [a]	34.5	57.8 [a]	11.3 [a]
CA049004221C	1382	1402	**3-Jul** [a]	36.3	57.3	11.8 [a]
CA04900843C	1307	1359	8-Jul	39.3 [a]	57.2	9.5
CA04900851C	1466	1523	9-Jul	41.8 [a]	57.7 [a]	9.6
CA0390B007C	1326	1373	10-Jul	40.5 [a]	**58.2** [a]	9.9
CA04900808C	1444	1500	6-Jul	**42.0** [a]	57.8 [a]	9.7
Trial Means	1376	1417	7-Jul	38.6	57.4	10.5
$LSD_{0.05}$ (by t)	NS	NS	2	2.9	0.7	1.0
C.V.% (s/means)	20.17	20.33	0.89	5.15	0.83	6.43
F-Value	0.40	0.40	9.79	6.85	21.14	10.86
P-Value	**0.92**	**0.93**	0.00	0.00	0.00	0.00

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level.

2010 Western Regional Chickpea Trial - Richland, Montana Agronomic Summary
Montana Ag. Experiment Stations - Central Ag. Research Center, Moccasin, MT

Entry	Grain Yield[1/] Harvest	Grain Yield[1/] 13% Moist	Canopy Height	Test Weights[2/]	Kernel Weight/Size	Grain Moisture[2/]	Disease Resistance
	---------- (lbs acre^{-1}) ----------		(cm)				(1:No ; 5-Good)
Sawyer	**633** [a]	**655** [a]	40.3 [a]				4.3
Sierra	226	233	38.0				4.0
Dylan	216	224	33.3				3.7
Dwelley	84	87	40.7 [a]				3.7
CA0469C025C	374	387	31.7	Pending	Pending	Pending	**5.0** [ns]
CA049004221C	530 [a]	549 [a]	34.3				4.7
CA04900843C	150	155	38.3 [a]				4.0
CA04900851C	207	214	41.3 [a]				4.3
CA0390B007C	288	298	40.0 [a]				**5.0** [ns]
CA04900808C	202	209	**43.7** [a]				3.7
Trial Means	291	301	38.2				4.2
$LSD_{0.05}$ (by t)	172	178	5.4				NS
C.V.% (s/means)	**34.5**	**34.5**	8.3				14.7
F-Value	8.89	8.89	4.54				2.13
P-Value	0.00	0.00	0.00				**0.08**

[a] - Denotes values equal to highest/earliest entry (in **bold**) based on the protected $LSD_{0.05}$.

[ns] or NS - Denotes means not significantly different or LSD was not protected at 0.05 level (see "P-Value").

[1/] - Trial severely impacted by Aschocyta blight and premature dessication (see "Notes" below).

[2/] - Due to low yields, not all entries had sufficient seed for Test Weight and Grain Moisture analysis.

Notes:
The field surrounding the trial plot area was dessicated with Paraquat on Aug 7, 2010. Due to disease pressure severity on this date and that dessication was being aerially applied and could not be applied without affecting the plot area, the "Okay" was given to dessicate the whole plot area. At the time, cultivars were in the late pod-formation, early pod-fill stage. Therefore, grain yields were impacted (the late maturing cultivars, i.e. Dwelley and CA04900843C, were more severely impacted).